

Private participation in the water sector: Recent trends and issues

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Abstract: Over the past twenty years, private sector participation in the financing, construction and operation of infrastructure facilities has emerged as a new paradigm of public service provision. This paper discusses whether there is evidence suggesting that the private sector may provide a more efficient mechanism for the delivery of water services, leading to sustainable use of water resources. It looks at recent trends in private financing in the water sector and examines the experience gained with respect to a number of issues, such as expanding access and service quality, the role of competition and regulation, efficiency, prices and the fiscal impact of the reforms. It concludes that private participation increases efficiency, fosters technical change and strengthens economic growth. Furthermore, private sector participation increases transparency in the use of public resources, reduces income inequality, improves the operation of the capital market, and contributes to social welfare.

Key words: water resources, privatisation, public service provision, water and sanitation.

1. INTRODUCTION

Governments and societies have in the past treated water mostly as a free or a social good. The increasing competition, however, for scarce water around the world has led to fierce disagreement over goals and methods of water management. Most probably, water will not continue for long to be considered a free or a social good. Societies cannot longer afford wasting of water resources and it has been observed that free water leads to wastage and inefficient use. Despite this unchallenged fact, some still believe that most water related decisions are ultimately political. Nevertheless, the view that gets increasing recognition is that "...the day when water could be considered a free good that would be automatically provided by the government at very low or no cost is gradually, but most certainly, coming to an end..." (Biswas, 2001). Thus, a re-examination is needed of the methods used to manage and allocate water to competing needs and sectors, and indeed this has been the focal point of an expanding literature (see Easter and Feder, 1996).

In addition, the forces that penetrate the society, such as globalisation, urbanisation and population growth, combined with the introduction of a rapid, far reaching technological change and an information flood, make existing water management structures obsolete. The new economy and society that emerges as a result of such changes requires innovations for new, comprehensive water management structures, new institutions and adoption of strategic water policies to pre-empt water shortages in the future. The Club of Tokyo considers two priority issues for the global water policy dialogue (a) development of a new paradigm and theory on water management and policy development, and (b) water pricing and cost recovery (Tortajada, 2001).

The prevailing paradigm of water management puts the public sector at the centre and almost all countries depended in the past on the public sector to provide water services to the population, but with questionable efficiency and quality of water supply and reliability services. In fact, the performance of publicly-owned and managed water services systems is generally dissatisfactory. Even in developed countries public systems perform with lower efficiency than private systems (see Easter, 1993; Estache and Rossi, 1999). Several institutional arrangements such as water markets

and other institutional forms for increasing efficiency and improving water supply and reliability services are sought for decentralisation of water management. For example, water users associations with sufficient responsibility and authority have in numerous cases been set up improving efficiency and services, while providing significant savings to taxpayers (Easter and Hearne, 1994). Also, the growing literature on water markets documents the capacity of markets to create efficiency gains and to provide an effective mechanism for allocating water among sectors (Easter and Hearne, 1995; Chang and Griffin, 1992; Colby, 1990; Crane, 1994).

Similarly, water supply networks have been run almost entirely by the public sector either at regional or municipal level but with large parts of the population without access to water and sanitation services of adequate quality and reliability, for lack of connection to such networks. Extending networks to provide the entire population with such services becomes an enormous financial task. The World Bank has estimated that the annual financial requirements for water supply and sanitation stand at about USD 60 billion over the next decade (World Bank, 1997). Bearing in mind the huge budgetary debts that many developing countries have accumulated over the years, it is important to examine new ways of meeting increasing needs for sustainable water management world-wide. An important dimension of development sustainability is to achieve financial sustainability (Mergos, 1997) and this directly points to the market mechanism and private sector participation.

The involvement of the private sector in infrastructure development is a recent phenomenon, in particular in the water sector, and it is strongly debated (Water page - PPP debate). Private sector participation in infrastructure (Private Participation in Infrastructure-PPI) takes many forms, the most common of which is a Public-Private-Partnership (PPP). The introduction of PPI in the water sector has been much slower than in other infrastructure sectors. Some feel that the introduction of PPIs provides a tremendous opportunity for growth, while others feel that it has gone too far and it is time to stop the tide (see Saade-Hazin, 2001). It is important, however, to observe PPPs emerging as a new paradigm of public service provision, a trend that takes momentum in a wide range of sectors (see for example, Samii et al, 2002; Link and Scott, 2001; Ahn, 2002).

Introducing water pricing and water markets, though, is not, as some believe, an automatic transfer of all water management functions to the private sector. It is rather a market structure in which the public sector may be seen as enabler providing an effective and transparent regulatory framework for private action (see for example, Chang and Griffin, 1992).

The purpose of this paper is to analyse recent trends and issues related to private sector involvement in infrastructure development, in particular in the water sector. The paper discusses whether there is evidence suggesting that the private sector may provide a more efficient mechanism for the provision of water services, leading to a sustainable use of water resources. The paper considers first briefly the general case, namely the trends and advantages of private sector involvement in infrastructure development. Then, it looks at recent trends in private financing in the water sector and examines the experience gained with respect to a number of issues, such as expanding access and service quality, the role of competition and regulation, efficiency, prices and the fiscal impact of the reforms. It concludes with a summary and evaluation of surveyed evidence with an attempt to provide a look forward to options available for achieving sustainable water resources management.

2. TRENDS AND ADVANTAGES OF PRIVATE SECTOR INVOLVEMENT IN INFRASTRUCTURE

Private participation in infrastructure takes place in several sectors other than water. In fact, private activity in the water sector trails such activity in other network industries. Thus, in examining private sector activity in the water sector. It seems natural to start with the general case and analyse why private activity expands in such industries and then to focus on the water sector.

The co-operation between public and private sectors in the financing, construction and operation of infrastructure (energy, transport, telecommunications, and water and sanitation) is a recent

phenomenon. The provision of such infrastructure services was until very recently the sole responsibility of the government or the public sector in general. The first attempts of privatisation of infrastructure services started in the 1970s and early 1980s, but in the 1990s the private sector participation in infrastructure projects evolved into a world-wide wave. The leaders in this private sector involvement were some developed countries, such as the United Kingdom, but also, unexpectedly, some developing countries.

The question that naturally follows is what are the forces that foster private participation in the construction and operation of public infrastructure. Also, whether there are possibilities for further development or has the method reached its limits. Finally, what is the experience from the use of the method world-wide. This section aims to present brief answers to these questions. It starts with a brief overview of the experience of using private participation in the financing, construction and operation of public infrastructure projects. Then, it explores the forces that stimulate private involvement in infrastructure and the advantages of private financing of such projects. Finally, it examines whether the market mechanism and the involvement of private sector in the financing, construction and operation of public infrastructure strengthens economic growth, increases transparency in the use of public resources, reduces income inequality, improves the operation of the capital market, and contributes to social welfare.

2.1 Recent trends of private sector involvement in infrastructure

According to World Bank evidence provided in Tables 1 and 2 the evolution of private sector participation in financing public infrastructure projects world-wide in the 1990s was rapid. Over the 1990-1998 period a rapid expansion is experienced of private financing of public infrastructure projects, but at the same time the public sector position is still dominant.

As shown in Table 1, the sectors with stronger private activity are telecommunications and energy, which together account for about 78% of total investment. In Table 2 it is shown that the world regions with stronger private activity in infrastructure are Latin America and East Asia with about 78% of total investment.

Table 1. Sectors of private sector participation in infrastructure

(1998 million USD)										
Sector	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total
Telecoms	6.6	13.1	7.9	10.9	19.5	20.1	33.4	49.6	53.1	214.0
Energy	1.6	1.2	11.1	14.3	17.1	23.9	34.9	46.2	26.8	177.1
Transport	7.5	3.1	5.7	7.4	7.6	7.5	13.1	16.3	14.0	82.2
Water-Sanitation	0.0	0.1	1.8	7.3	0.8	1.4	2.0	8.4	1.5	23.3
Total	15.6	17.4	26.6	39.9	44.9	52.9	82.4	120.4	95.3	496.2

Source: World Bank

Table 2. Private participation in infrastructure development by region of the world

(1998 million USD)										
Region	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total
East Asia	2.3	4.0	8.7	15.9	17.3	20.4	31.5	37.6	9.5	147.2
Europe	0.1	0.3	0.5	1.5	3.9	8.4	10.7	15.3	11.3	52.0
Latin America	12.9	12.3	17.1	18.0	18.4	19.0	27.4	45.1	66.3	236.5
MiddleEast-Northern Africa	0.0	0.0	0.0	3.3	0.3	0.1	0.3	5.2	3.06	12.8
South Asia	0.3	0.8	0.1	1.2	4.3	4.0	11.4	13.7	2.3	38.1
Africa	0.0	0.0	0.1	0.0	0.7	1.0	2.0	3.5	2.3	9.6
Total	15.6	17.4	26.6	39.9	44.9	52.9	83.3	120.4	95.3	496.2

Source: The World Bank

The trend is continuously increasing up to 1997, but reverses in the middle of 1997 and declines in 1998, mainly East Asia and in particular in the energy sector. The reason for this decline is probably related to the East Asian financial crisis.

According to World Bank data, the developing countries invest about 4 percent of their GDP in infrastructure every year, which amounts to a total annual investment of about 250 million US dollars. Therefore, an average annual investment of 100 million US dollars in the period 1996-1998 amounts to only 40% of the total in infrastructure in developing countries. However, public infrastructure projects have a significant component of public financing in parallel with their private financing.

The sectors that have attracted most of private financing in the 1990s were telecommunications and energy. This is explained from the strong technological developments that took place in these sectors during this period. The new technologies in telecommunications reduced the cost of basic infrastructure and allowed significant changes in market structure, increasing competition. In energy private sector involvement increased for the same reasons, but to lesser extent.

The private sector activity was smaller in the transport and water - sanitation sectors, at least in comparison with the other two sectors. The delay of private sector involvement in these two sectors is attributed mainly in the lack of rapid technological advances, the existence of political obstacles and the inability of the central governments to continue due to lack of co-operation with regional and local governments.

2.2 The forces of private sector involvement

There are a number of factors that lead to a change in the prevailing paradigm of service provision and induce private sector involvement. The first and most important is the growing inability of the state, regional and local authorities to meet the basic needs of the population due to political, financial and institutional constraints. The role of the state, as it was considered since the 1950's, is gradually called into question and many countries irrespective of their political orientation embark on economic reforms (Gray, 2001).

The main factor is the rapidly growing demand for infrastructure services due to population and income growth mainly in middle income countries. In addition, high degree of inefficiency prevails in public sector provision of services and there is growing recognition that the private sector can play a role. It is repeatedly realised world-wide that most public service delivery mechanisms are more efficient when are private operated.

Also, municipal and regional governments are considering alternative ways and means for expanding supply and reliability of infrastructure services to their citizens, but without increasing taxation burdens. It is infeasible for state, regional and local governments to expand infrastructure immediately to meet growing demand because it would require an extensive investment programme to ensure continuous financial viability of the services provided.

Further, state and public sector provision of infrastructure services has not been able in the past to redress inequalities, characterised by significant discrepancies in the level and reliability of services provided to various population segments. Public provision of infrastructure services does not necessarily improve the situation of the poor segments of population since the largest part of the benefits is captured by those population groups who are better off. Income distribution objectives can be addressed with different means, other than providing free or low cost services.

A long term realistic planning of investment and operation is needed to ensure infrastructure services of sufficient level and quality. The private sector can get involved in a variety of ways in the planning, financing, construction and operation of infrastructure projects and can undertake more responsibilities adopting appropriate service delivery mechanisms (Jackson, 1998). Such responsibilities involve financing, construction, operation and maintenance, but even ownership of infrastructure. Several countries have adopted legislation providing incentives for private investment in infrastructure and specifying the institutional framework within which the private sector's participation in public works.

The main benefit, however, comes from bringing competition and reducing inefficiency in the delivery of public services (see Ahn, 2002). As it is well known in economic policy, competition brings, first, static efficiency gains. Such gains are, however, small. Increasing attention is given now on gains from dynamic efficiency gains, i.e., productivity gains that come from the introduction of innovations raising the level of growth (Spence, 1984). The source of such productivity gains is the link between market structure and industry performance.

In addition to such static and dynamic efficiency gains that foster growth, Aghion and Howitt (1998) turn their attention to the impact of incentives, innovation and selection on growth. They conclude that the impact of competition enhancing policies is of long term nature by affecting the structure of incentives for producers and consumers, encouraging innovation activities and technological change in the production and delivery of services and influencing investment decisions. There is already a large body of empirical evidence suggesting that increasing product market competition strengthens productivity growth.

Thus, it can be safely concluded that there are several benefits from the involvement of private sector in infrastructure. Such benefits are obtained because private construction and operation of public infrastructure introduces competition, increases efficiency, fosters technical change and strengthens economic growth. In addition, private sector involvement in infrastructure increases transparency in the use of public resources, reduces income inequality, improves the operation of the capital market, and contributes to social welfare. There are, however, benefits from private financing also and we turn to them next.

2.3 The advantages of private financing

The partnership between a public entity and a private financing institution in the construction of a particular development project has several advantages. The main advantage is that it is not the public entity that borrows for the investment, but the contractor and, thus, the burden of the loan is not borne by the taxpayer but by the user. This element ensures social equality because it is charging the user rather than the taxpayer creating a proper incentive structure. This does not happen when the service is financed through the budget because the burden is borne by the taxpayer who may be different than the user. Further, the free provision to the user may induce inefficiency by encouraging waste.

The private financing as well as the private operation and maintenance of an infrastructure project increase transparency and efficiency in the use of public resources. It should be stressed that this presupposes capacity for monitoring evaluation and auditing on the part of the public sector. Also, the private financing of infrastructure projects frees public resources that can be used in other objectives and activities of the public sector or the state.

In addition, the flexibility of the private sector allows quicker introduction of new technologies, access to know-how and guarantee of service quantity and quality, all of which the public sector cannot provide. One of the main weaknesses of the public sector, common in all public sector projects, is cost and time over-runs. Private sector involvement usually reduces construction time and cost considerably, ensuring at the same time quality and quantity of services provided.

It is important to stress, however, that the completeness and the stability of the contracts that determine the responsibilities of the parties involved constitute important determinants for the success of the project. For this reason, a country with a competent and efficient public service is able to achieve better contract terms and quality of services, compared with countries where public service is characterised by lack of meritocracy, incompetence and corruption.

Moreover, the most important advantage of private financing of infrastructure is the sharing of risk between the parties involved. The risk and return of the infrastructure project is borne not only by the contractor but also by the investors (shareholders, creditors, bond holders). Precisely because risks are shared, the main criterion for the suitability of a project for private financing is whether the project is sustainable as an independent legal and economic entity. This implies separation of the

accounts of the contractor from those of the project, the separation in particular of assets and liabilities, and the cash flow.

The private financing of infrastructure uses modern financial instruments and is different than traditional financing, which is mainly corporate financing. In corporate financing, the traditional type of financing, the contractor is responsible to the investors and the creditors, supported by its balance sheet and assets. Although creditors usually tend to select viable projects for financing, for not creating cash-flow problems for the contractor, the main decision factor for the creditor is not project viability, but the economic assets of the contractor and its reputation.

The supply of guarantees often remains a basic element for making the project attractive for investors. In the case where there are no guarantees, the financing of the project is an agreement where the investors and the creditors who finance the project have no resource against the contractor, as it would have been for example with the case of loan securitization. In contrast, there are cases where the contractors supply guarantees to the investors and the creditors, often with guarantees for the period up to the completion of the project. However, despite the above, the main source of repayment of the creditors and investors is the cash flow that is produced by the project.

Thus, private financing is suitable for projects, which can be planned as independent financial entities, independent of the company or companies involved in their implementation. Usually such projects are big enough, complex in their construction and operation, expensive, requiring costly equipment and needing long term financing.

For this reason, as a result of the high risk involved in such projects, their financing, construction and operation is undertaken by consortia of private companies, which include construction companies, banks, management consultants, as well as suppliers of specific services needed for the operation of the project.

The planning of a project proposed for private financing must be very detailed, determining clearly in a contract the responsibilities, which are legally binding, of the parties involved. The cost calculation of the project and the way of its financing, although risky, is not particularly difficult. In contrast, it is extremely difficult and important for the viability of the project the calculation of the cash flow from the size of the projects' services. As a result, the main source of risk for a project proposed for private financing is the magnitude, viability and possible mistakes in predicting the number of users and the income of the project from user fees.

Therefore, the precision of the prediction, at least for the initial years of operation, of the users and the income of the project is of particular importance for the success of the project. This prediction of users and income from user fees is undoubtedly costly and time consuming but absolutely necessary for the proper design of the project and the treatment of risks. Correct prediction of users and income from user fees ensures a healthy cash flow and financial viability of the project, ensuring all parties involved their harmonious relationships.

2.4 The prospects for private financing of infrastructure

The crisis of 1997 in East Asia and the severe decline in the financial markets world-wide that followed influenced significantly the flow of investment towards infrastructure projects. What became apparent was that the risks had not been calculated properly. In particular, the clauses of the contacts proved impotent and in certain cases non enforceable, because in several projects no provision has been made for particular risks, such as severe foreign exchange volatility. However, despite the crisis, private financing of infrastructure remains a very strong instrument with which investors, lenders and government share the risks, as well as the benefits of a new investment with a fair and efficient way. As the emphasis on corporate governance increases, the private financing of infrastructure ensures transparency in the use of public sector resources and increases economic efficiency, stimulating growth and prosperity.

Despite the crisis in East Asia the prospects for increasing private participation in infrastructure investment are maintained. The reason is that the demand for public infrastructure services in developing countries, in particular, is very high and increases rapidly due to strong population

growth. The financial inability in most cases of the governments to construct facilities in order to provide such services makes the involvement of the private sector unavoidable. Meeting the demand for such infrastructure services is essential for development, not only for economic infrastructure, such as telecommunications and transportation, but also for social infrastructure such as education and health.

It is estimated that the supply of private funds is inadequate to meet the rapidly increasing demand for private financing not only in sectors where already private financing has been established, but also in new sectors. These new sectors are mainly sectors where investment at present is considered risky and where the techniques of project financing will become a strong instrument for risk sharing.

It has been mentioned that the expansion of private financing of infrastructure strengthens economic growth, because it mobilises private resources unemployed previously and frees public resources. Also, increases the volume and depth of the capital market where private capital is raised from public savings and, thus, improves the operation of the banking system.

It should be noted, however, that private financing is not a panacea for accelerating economic development of a country and increasing competitiveness of its capital market. For private financing to become a strong and transparent source of finance of the economic development of a country, the necessary prerequisite is a transparent legal framework of the operation of the capital market and the banking sector. Such a legal framework will support the efficiency and competitiveness of the economy, will mobilise domestic resources and will increase savings and investment in the economy and, finally, will strengthen growth and development of the country.

3. THE EXPERIENCE IN THE WATER SECTOR

Operation and financing of large-scale water projects by the private sector has become popular only recently. In the UK, where privatisation of infrastructure was introduced in the late 1970s and 1980s, privatisation in the water sector started as late as 1989. Private participation in the water sector in developing countries was rare before 1990 and only a handful of projects have been awarded to private companies.

However, from 1990 onwards private participation in the water sector in developing countries started increasing and a growing number of governments are turning to private sector to build, rehabilitate, expand and/or operate their water and sanitation networks. In the years up to 1997 more than 90 projects in thirty-five countries concerning water resources management have been undertaken by the private sector. Along with the number of projects, private capital investment for water projects in developing countries increased rapidly, but a small number of international companies dominate private activity in the sector. It is worth mentioning that only a few major international companies dominate the water market in the developing countries. If we take into account the regions that various companies operate, it becomes obvious that the companies prefer to specialise in specific regions and only one company operates in all five regions (see Silva et al, 1998).

Private participation in the water sector is not only slower than in other sectors, but it is also concentrated in certain regions and countries, in particular those countries or regions that have already been familiar with private financing of infrastructure. The regions of East Asia and Latin America have more projects with private participation in water related management projects than other regions of the developing world. This trend is similar to private involvement in other sectors in the same regions, such as energy and transport. In particular, in Latin America the introduction of PPI projects can be considered the result of the opening of the markets taking place there for the past decade (see Gray, 2001).

In Europe and Central Asia as well as in the Middle East and North Africa, private involvement in the water sector is still relatively limited but steadily growing. In Sub-Saharan Africa, private investment in the water sector is virtually non-existent. The same can be concluded about South Asia as well.

Table 3. Private water sector projects in developing countries

	Projects	Investments
East Asia / Pacific	30	11,913
Europe / Central Asia	15	1,499
Latin America / Caribbean	40	8,225
Middle East/ Northern Africa	4	3,275
Sub-Saharan Africa	8	37
Total	97	24,950

Source: Adapted from Slilva et al. (1998)

Moving on to discuss the efforts of specific countries one may observe that few are the countries that lead the way. Specifically Argentina has awarded seven water contracts to the private sector for a private investment of over US\$6 billion. In East Asia, China has awarded thirteen contracts and Malaysia six, together representing 63 percent of the East Asia total of thirty projects.

The projects in various countries differ greatly in size. The number of contracts awarded is not directly related to the total investment in projects with private participation in the country. For instance, the three countries with highest number of projects undertaken by the private sector, China, Mexico and Brazil have awarded only small contracts, and account for only 7 percent of investment in developing countries in the water sector. On the other hand the Argentina, the Philippines, and Malaysia have awarded 16 private projects, which however account for 69 percent of all private investment in the water sector.

Table 4. Developing Countries with Private Water Projects

Country	Total investment	Projects
Argentina	6,183	7
Philippines	5,820	3
Malaysia	5,030	6
Turkey	1,230	2
Mexico	597	12
Brazil	583	8
China	503	13

Source: Adapted from Silva et al (1998)

Despite recent expansion, private participation in the water sector represents, still, a small part, about 5 percent, of entire water sector in the world. There is a tremendous variation in the institutional and political organisation of the sector worldwide ranging from state companies to co-operatives. In certain countries responsibility for water rests with the municipal or provincial governments rather than with the national government.

In addition, many countries continue to consider water as a social good rather than an economic good, insisting on pricing policies that lead to inefficiency, lower access and quality of services, putting the burden on the budget. Given the growing concerns about water scarcity and deteriorating quality, as well as stringent public finances, the question is for how long they will be able to continue such pricing policies. However, many countries instead of introducing private activity have opted for reforming water pricing policies (see Dinar, 2000).

3.1 Institutional options for private participation

There are three types of private participation in the water sector. The first is known as the French type, where a large company concludes a contract with the government, ranging from a service contract to concession arrangements. The second is known as the British type where the infrastructure and its assets are sold to the private sector and the state becomes responsible for regulation and control of the new private monopoly. The third is known as the Dutch type with shares and infrastructure owned by a state company, operated as an independent legal and economic

entity, separate from the state budget. In addition, throughout the developing world there are several types of small scale private operators who have recently started attracting attention as efficient providers of services to poor segments of the population at low investment costs. Among the above, international financial institutions such as the World Bank promote the first type. This type involves different options with respect to ownership and investment.

The main options available for a PPI in any network industry can be distinguished, as shown in Table 5, by how they allocate responsibility for such functions as asset ownership and capital investment. For example service contracts transfer little risk and responsibility to the private sector, but also offer little gains, since they are not designed to address managerial inefficiency or chronic underinvestment. On the other hand, concessions and divestitures are well suited to tackling these problems, but demand more from government in commitment and preparation.

Table 5. Options for private participation in infrastructure

Option	Asset Ownership	O & M	Capital Investment	Commercial Risk	Duration
Service contract	Public	Public / Private	Public	Public	1-2 years
Management contract	Public	Private	Public	Public	3-5 years
Lease contract	Public	Private	Public	Shared	8-15 years
BOT	Private	Private	Private	Private	20-30 years
Concession	Public	Private	Private	Private	25-30 years
Divestiture	Private	Private	Private	Private	Indefinite

Source: Adapted from Brook-Cowen (1997).

Concessions are by far the most popular. Of the 97 contracts with the private sector, 48 are concession contracts, accounting for 80 percent of all private capital investment. Concession contracts are considered so popular for governments, because they transfer all the associated risk to the private sector. However, these types of projects require significant government commitment and an acceptable regulatory environment for the private sector to operate.

3.2 Expanding access and service quality and impact on the poor

Expanding coverage and quality of safe water and environmental sanitation to large parts of the population, a fundamental right of all, is a major challenge for all countries (Nigam and Rasheed, 1998). Public ownership usually leads to mis-pricing and thus to inability to maintain existing networks resulting in lower quality services, let alone to finance network expansion (Gray, 2001). Although such low-price practices are claimed to benefit the poor, available evidence suggests that the policy is in fact harmful to the poorest sections of the population, who lack access to network services and often pay very high prices for inferior substitutes (Walker et al, 2000).

It has been observed that PPI contracts in the water sector have generally led to better quality and operating efficiency for existing customers (Tynan, 2000). However, in certain cases although it was expected that the project would extend formal services to households relying on non-network sources, the experience has shown that in most cases such expectations did not materialise. The PPIs have not been generally successful in extending services to the poorest households and have in certain cases inadvertently created barriers to service (Tynan, 2000).

Some PPIs have specifically targeted low-income areas. For evaluating success of such efforts one has to measure: (a) whether the project has extended connections to previously unconnected households; (b) whether the project improved reliability of services; and (c) whether the project reduced non-payment for service.

There is evidence that the large-scale private water and sanitation projects have increased service efficiency and financial performance (e.g., Aquas Argentinas). There is also evidence that the poor households benefit from efficiency gains that free up government resources to be used in other

sometimes pro-poor projects (Merald and Shirley, 1999). However, evidence on the network expansion suggests that private companies focus mainly on connected households, showing little progress and impact on extending services to the poorest unconnected households (Merald and Shirley, 1999).

Furthermore, there is evidence that privatisation may harm the already connected poor households in the short term by removing cross-subsidies from industrial to domestic consumers (see the case of the UK, Tynan, 2000, p. 21). In a certain case a tariff increase that raised rates equally for all customers caused a non-payment campaign that led to the failure of the project (Tuccunam Argentina, Tynan, 2000, p. 21). There is, however, evidence showing that in several cases poor customers are often willing to pay more than conventionally thought for getting access to reliable services.

However, the gains for the poor from the medium and long-term sustainability and reliability of service far outweigh the short term harm of tariff increases. From available evidence it seems that concession contracts have a potential to harm poor consumers, but it is still unclear yet which clauses or regulations do in fact harm the poor. Most likely, exclusivity clauses are a potential source of harming the poor.

It has been observed that households that do not receive public services due to lack of connection to such networks are willing to pay for the quality and reliability of services provided with such services. Thus, there is empirical evidence that there is an expressed willingness to pay for improved services.

Overall, available evidence suggests that private participation can improve, to a large extent, service provision to the poor and save budgetary resources for other perhaps pro-poor, projects. In many cases poor households demonstrate high willingness to pay for improved services with contingent valuation studies. But on the other hand, private participation does not score well on extending network services to poor households and this may be considered a focal point for innovation in contract design (Tynan, 2000).

3.3 Competition and regulation

Sectors characterised as natural monopolies have weak incentives for efficient operation. The introduction of a market-based system of operation has several beneficial effects and ownership reform should be complemented with the introduction of competition when possible for achieving efficiency improvements and for helping transfer demand risk from taxpayers to users. Several studies have found that introducing competition in several sectors has led to significant efficiency gains, the largest part of which is passed on to consumers.

Introducing competition in an infrastructure sector is the preferred action, when possible. Whenever, however, such action is impossible because the sector is a natural monopoly, either public or private, implementation of close regulatory supervision is required. Introducing competition in the water sector is more difficult than in other network industries, because the technical characteristics of the sector differ considerably from those of the other sectors, such as gas, electricity and telecommunications. There are several such differences. One is the difficulty to induce competition among suppliers since the cost of the private network accounts for a large part of the total cost of water leading in most cases to a natural monopoly.

When the introduction of conventional product-type market competition is not feasible, other forms of competition may be introduced. For example, the award of water concessions in several countries occurred using a competitive bidding process. Thus, competition in the water sector can be implemented by increasing the use of competition in purchasing inputs, by competitive bidding for the right to supply an area and by benchmarking rival utilities in different areas.

A liberal entry policy may be designed to benefit consumers by allowing competition for the provision of services to those not connected to the network. This requires the removal of legal barriers. This is in fact the case in small scale private providers of water services around the world, such as the water providers (Aguateros) in Paraguay.

When entry is not possible and the sector operates as a natural monopoly, regulation is necessary. Although quality of water is important and vary considerably, consumers are unable to verify water quality. In this case the regulator must include both price and quality of water and there are significant difficulties including both in regulating the water sector (Klein and Irwin, 1996). The regulatory paradigm has a long history in the US and emerged as a key element of infrastructure reforms worldwide. The importance for establishing a regulatory framework is high for another reason also. Even for public natural monopolies it is important to separate the public sector's roles of policy making and regulation. Establishing, therefore, independent regulators promotes stability in the regulatory framework and efficiency in the regulatory function.

3.4 Efficiency, prices and fiscal impact

Operational inefficiency is common in public sector monopolies because of weak incentives to reduce costs and to address technical and non-technical losses. Incentives to labour are usually not well structured. Employment levels also are often inflated due to political interference and therefore labour productivity is quite low. As a result operational efficiency is low, and access and quality of service to consumers is poor. Studies of the performance of public and private water companies in the Asia and Pacific region finds that public operators are generally less efficient than private ones (Estache and Rossi, 1999; Bhattacharya et al, 1994).

Private participation can improve efficiency in the water sector in several ways. Introduction of competition brings static and dynamic efficiency gains. However, the most important efficiency gains come from changing the incentive structure, inducing innovation and influencing investment decisions, as discussed earlier. In the case of a natural monopoly the separation of operational and regulatory functions is necessary. Creating an independent regulatory body, free from state intervention, is not an easy task and requires an efficient public administration. The magnitude of efficiency gains from changing the structure of public service provision is directly related to the incentives created by the competition and regulation.

Prices under public ownership are often controlled to meet short-term political objectives. Such pricing practices lead to significant efficiency losses, limited maintenance affecting the quality of the service provided and lack of expansion to the detriment of the poor.

Privatisation may affect prices in various ways. First, if prices were before fixed at below-cost levels, then prices after privatisation would need to increase. Second, efficiency savings will lead to a reduction in prices with some gains passed on to consumers. Third, the cost of private financing may lead to an increase in prices. Prices after privatisation will reflect full costs with the consumer being charged instead of the taxpayer.

Public provision results directly or indirectly in a burden to government budgets. If prices are set at below-cost levels, subsidies are offered to consumers at the expense of taxpayers. Loss making infrastructure services have traditionally been a major drain to government budgets.

3.5 Experience from specific countries and projects

The UK is a forerunner in private participation in infrastructure. Privatisation in the water sector started in 1989 with selling assets under licence and by setting up an independent economic regulator. The regulator uses price caps and yardsticks to improve competition. However, such regulatory efforts have heavy requirements in information and are not always easy to prevent political interference (see van den Berg, 1997).

In Sydney, Sydney Water, a State Owned Company operated till 1995 as a Statutory Authority (The Sydney Water Board) incorporated in 1995, is responsible for capturing, storing, treating and distributing water. Faced with major capital outlays to upgrade and expand water treatment capacity and having established private willingness to pay for services, Sydney Water decided to contract out to private companies for privately built, owned and operated (BOO) system of water treatment.

Prices were regulated by a Government Pricing Tribunal, now an Independent Pricing and Regulatory Tribunal. Following some unusual climatic conditions that led to the deterioration of water quality, major concerns have been raised about quality of services unforeseen in the contract, putting the contractual relationship into test. It remains to be seen what impact such events might have on risk sharing, contractual transparency and regulation (Chapman and Cuthbertson, 1999).

In 1993 the city of Buenos Aires in Argentina decided to place the responsibility for operations, maintenance and investment in the water and sanitation sector to a private consortium, Aquas Argentinas. Within the first two years of operations, production capacity expanded 27 percent, an additional 500,000 people received water services and an additional 400,000 received sewerage services, and the response time for repairs fell from over a week to just two days.

In Caracas, Venezuela, an attempted concession failed to attract any bids, partly because of the lack of good working relationships among participating municipalities and political commitment.

In Guinea, a lease arrangement that has had some success in improving water quality is hampered by lack of credible provisions to extend affordable connections to a very low-income population. Moreover, co-ordination problems with the government have resulted from lack of clarity in the allocation of commercial risks. Furthermore, high tariffs have also resulted in serious non-payment problems.

In Mexico City the government awarded ten-year management contracts for each quadrant of the city to four separate private companies. The private sector was responsible for installing meters, billing and collecting tariffs, and rehabilitating the system. However the devaluation of the peso in 1994 caused a serious setback, since operator fees and equipment purchases were denominated in foreign currencies.

In Malaysia the government decided to award a 28-year concession to private consortium, which would undertake the responsibility to upgrade, rehabilitate, and to extend the country's sewer system. Since 1993, when the contract was awarded, progress has been considered quite slow due to significant public and commercial backlash from tariff collection and tariff increases.

In South Africa, communication between parties involved has failed and the involvement of the private sector in the provision of local water supply has resulted in serious operational problems of the projects. It has become obvious during the operation of the projects that despite the community participation guidelines prepared by the Department of Water Affairs and Forestry and the obligations written into the contracts, communities were not consulted by the contractors. As a result, there are major problems concerning the sustainability of completed projects.

Finally, a case slightly different from the others and which requires special attention, is that of Bolivia. In Santa Cruz, the largest city in Bolivia, home to one million people, operates the world's largest co-operative, known as SAGUAPAC. It actually proved to be highly efficient and effective. The unaccounted-for-water levels are relatively low, all connections are metered, the number of employees per 1000 water connections is quite low and there is a 96 percent bill collection efficiency rate. Its success can be attributed to two key advantages: its co-operative structure shields management from undue political interference and moreover it can implement investment projects much faster and more efficiently than other companies, because it is not bound by legal delays and can finance an external loan more easily. However, a successful co-operative is an exception rather than the rule, because the experience with the co-operative model in various sectors worldwide is rather disappointing.

4. LESSONS AND PROSPECTS FOR SUSTAINABLE WATER RESOURCES MANAGEMENT

Water has played a very important role in the development of society either for the production of food or for domestic use throughout human history. Over the last three decades, however, due to the rapid population increase, water resources available per capita are dwindling and water is increasingly becoming a scarce resource. Environmental and management efficiency problems aggravate the scarcity situation and result at serious water supply shortages in certain countries or

regions. Even a cursory review of recent trends reveals that we may be approaching a period of water shortage, not only in the Mediterranean region, but also in an increasing number of countries world-wide. Whether this will result in a water crisis or not will most probably depend on whether we will be able to take appropriate measures to avert such shortage by ending "the water policy drought", as suggested by Anderson (1983).

Increasing demand for water is the first of the ingredients of a water scarcity situation. Population growth fuels demand for water for the production of food, but also for domestic and for industrial use. The three sectors compete for water allocation and this competition will get more intense in the future. Agriculture uses up to 80 percent of total water use and it seems likely that availability of water rather than land will be in the future the binding constraint to expanding food production world-wide. In addition, many countries face serious difficulties in ensuring self-sufficiency in meeting domestic and industrial water demand. Also, rapid income growth in developing countries leads to changes in consumption patterns in a way that increases further the demand for water. Furthermore, recently the environment has developed as an important claimant for the use of water in maintaining ecosystems. As a result, the balance of the sectoral water distribution will most probably be a contentious issue.

Wasting water is a common practice in all sectorial uses. Waste in irrigation is probably the largest because irrigation is the largest user of water in almost every country and is highly inefficient. As a result, the water scarcity a country is facing is related to a large extent to the way its water is used for irrigation. The waste however is not limited only in irrigation. Waste is prevalent in domestic and industrial use also. Therefore, there is a need for improving the use of water and managing demand more effectively, within sectors and between sectors.

There are several alternative institutional arrangements for managing demand to pre-empt a situation of increasing water scarcity and to resolve conflicts over water use. However, prevailing management practices emphasise the augmentation of supplies with technologies, institutions and policies focusing on introducing water saving practices. However, a more appropriate approach, from the economics point of view, is to promote an incentive structure that will put an end on over-exploitation of water resources and the use of inefficient, unsustainable water use practices.

We have to find ways for developing policies for more efficient management of water, contributing to the welfare of the society. Improving the quantity and quality of water services to the population is among the most pressing societal goals and aspirations.

The experience gained shows that although in the past decade there has been a significant increase in the number of projects with private involvement in the power or telecommunications sectors, that doesn't seem to be the case for the water sector. Private participation in water resources management, although it has increased considerably in the past years, it is still relatively limited. Like other infrastructure sectors, water and sanitation is characterised by large investments with long payback periods. But in contrast with the telecommunications and power sectors, there is little or no scope for introducing direct competition in any of the main operational segments of water sector, such as treatment, transmission, or distribution.

In the water sector there are additional obstacles that prevent water projects from achieving economic feasibility and proper risk allocation. One of the main obstacles is the need to establish new regulatory structures, the raising prices and the increasing investments because of the demand for public service. Moreover the value of the existing underground assets is often uncertain. For these reasons, there have been fewer private projects in the water sector than in the power or telecommunications sectors.

Privatisation of water utilities and private sector financing is increasingly being looked at as a major market-based approach for sustainable financing of water supply and sanitation. However a number of issues remain to be solved, although some of them have already been solved for other sectors. Such issues are: (a) how to control natural monopolies, such as piped water supply and sanitation services; (b) what accountability mechanisms do we put in place for private operators and regulators; (c) how do we achieve transparency in finance and in performance; (d) how do we

choose set targets; (e) how can we increase our knowledge of regulation; and (f) how to cope with corruption.

It seems that there are no uniform answers to such questions and countries wishing to use the PPI method in the water sector should develop custom made solutions. Several multilateral organisations offer support to cities as well as national governments that wish to attract private capital in the water sector. The method for private participation in water and sanitation, developed by the World Bank with the assistance of the UK's Department for International Development, provide guidance on such issues as how to choose a private sector participation option, how to design a process for refining and implementing that option, and how to ensure that contracts and regulatory arrangements cover all the relevant issues (see Brook Cowen, 1997).

In the near future, opportunities, especially in the developing countries for private participation in new water projects, are going to increase. These may be seized by either companies that already have some previous experience in the field, or by new companies. Although many companies operating in developing countries are already expanding their activities, by investing in new projects, they many face constraints due to managerial economies of scale. Therefore, the rate of expansion of private involvement in the water sector will depend on new entrants to the sector.

A serious barrier in the entrance of private companies in the water sector is the attitude in many countries. Although, governments usually take measures to prevent any abuse of the monopoly power by the private sector, large segments of the population in many countries do not trust the market for supplying such services and regard private operators as rapacious profit-takers. On the other hand, private companies often require some profit in order to take the risk and invest in a country and try to improve a water system, whose condition is usually barely known.

Governments have often tolerated high levels of corruption and inefficiency by public water company officials; nevertheless they can become demanding and reluctant about allowing a relatively modest profit taking by a private company. Of course this does not mean that private companies with a monopoly in water supply should be allowed to choose whichever profit level they wish. But governments should be realistic regarding the level of profit they allow, thus recognising the risks the private sector takes, by undertaking this kind of investments. Otherwise it will become increasingly difficult to attract private capital in the water sector.

For a private contract in the water sector to be successful, the government should have the necessary political commitment and to put in place the institutional arrangements in order to support the contract. Rigorous management and a high degree of technical skill are also essential, as well as transparency and fairness. A good definition of the government's roles and responsibilities is also very important. Finally it is crucial for the success of the project that the private sector is competent and independent of political or industrial pressures.

For achieving sustainable water resources management each project in the water sector should be examined for (a) ecological sustainability, (b) operational sustainability and (c) financial sustainability (Mergos, 1991). Ecological sustainability refers to the lack of any undesirable effects on the ecosystems and there are numerous examples of projects, which although were considered efficient, had several adverse effects on their surrounding environment. It is important to bear in mind that a certain degree of operational flexibility is required to achieve sustainability, since needs change over a period of years and projects constructed today may be required to fulfil different objectives twenty years later. Finally, financial sustainability is achieved by a project when it is self-sustaining financially and do not pass operational cost to the taxpayer. Most governments of developing countries have very tight budgets and therefore do not have the capacity to cover the annual operational costs of projects.

As the analysis in the previous section has shown, for achieving financial sustainability there are a number of possible options for the governments of developing countries to choose from, if they wish to allow private participation in water resource management. In order to determine which options are feasible, several analyses need to be conducted.

First of all, it is important to determine the current state of the water system. This may require careful investigations since a great percent of the assets is underground. Moreover, information is

required concerning the quality of service, the level of human resources and the financial performance.

Furthermore, it is necessary to review the current regulatory framework so as to determine whether the existing framework can provide the necessary support so that the private sector can operate successfully. This would include an analysis of both the general laws and the sector specific laws; if the framework is not sufficient, it is important to establish the required changes.

Additionally, it is very helpful to review the opinions of all parties concerned regarding the private participation. This would include employees, consumers, government agencies and environmentalists. Any possible concerns should be addressed early on so that they do not cause any additional problems later.

Finally an analysis of the financial viability of the alternative options has to be conducted. The project has to be financially independent, meaning that the tariffs should cover costs. If the current tariffs are too low and it is necessary to raise them, it is necessary to determine whether such a raise is acceptable by the consumers. If not, it is the responsibility of the public sector to cover the difference.

The above analysis can lead the government to choose a specific option. For example in country where the existing regulatory framework is rather weak, it would be difficult to implement a concession. The same would be true for a country that lacks a good business climate, since it would be difficult to attract the private capital necessary to implement such a large project. For these countries, it would be perhaps best to start with a management contract and then continue with options, which require further private participation.

5. CONCLUSIONS AND POLICY IMPLICATIONS

Water has played a very important role in the development of society either for the production of food or for domestic use throughout human history. Over the last three decades, however, due to the rapid population increase, water resources available per capita are dwindling and water is increasingly becoming a scarce resource. We rapidly approach the era when water will not any more be provided at low or no cost by governments, not because they lack willingness but because they lack capability. Water cannot any longer be treated as a free or social good.

The rapidly increasing demand and waste of water in management are the main ingredients of water scarcity. Population and income growth fuel demand for water for the production of food, but also for domestic and for industrial use. Also, wasting water is a common practice in all sectorial uses, with waste in irrigation being probably the largest. Waste is prevalent in domestic and industrial use, also. Fiscal, political and institutional constraints limit the capability of public governments, either at state or regional and local level to meet the increasing demand. The need for improving the use of water and managing demand more effectively, within sectors and between sectors increases. A new paradigm in water management is long overdue.

During the past twenty years a new paradigm starts emerging for delivery of public infrastructure services, including water, and it has expanded rapidly in the 1990s in all infrastructure sectors in several countries and regions around the world. This paradigm takes the form of a private public partnership for the financing, construction and operation of infrastructure facilities. This paradigm faces strong opposition from several quarters, but mainly from those who consider water a social good and advocate free delivery to all by the public sector.

The issue, however, is not whether water is a public or private or economic good; it is the inability of the state to meet the fundamental right of all to safe water due to political, financial and institutional constraints. Also, the high degree of inefficiency that has prevailed in public sector provision has led to a growing recognition that the private sector can play a major role in achieving the fundamental right of all to safe water and environmental sanitation.

The involvement of the private sector in the provision of water related services may be approached as an institutional innovation that responds to the needs of the economy and society. The actors that operate in the water sector change gradually, with increasing involvement of the

private sector and civil society in decision making. Decentralisation and participation vs. public service provision should be considered an issue rather than a dogmatic choice. Alternative institutional arrangements should not be judged dogmatically, but with juxtaposition to facts on the basis of information giving evidence whether the proposed institutional arrangements improve access to affordable water of good quality and to sanitation services, leading at the same time to sustainable use of water resources.

It can be safely concluded that there are several benefits from the involvement of private sector in infrastructure. Such benefits are obtained because private construction and operation of public infrastructure introduces competition, increases efficiency, fosters technical change and strengthens economic growth. In addition, private sector involvement in infrastructure increases transparency in the use of public resources, reduces income inequality, improves the operation of the capital market, and contributes to social welfare. Private financing leads, in addition, to significant benefits from risk sharing and overcoming tight public budgets.

Given, however, the political nature of the debate on whether water is social or an economic good, a political balancing may be required, including the provision of a basic level of service to all and high tariffs for others. The basic level of service with low running costs should aim to reach all consumers as soon as possible, while encouraging further upgrading at the consumer's expense.

Finally, we should not forget that 95% of the people around the globe are currently served with water related services by the public sector. This cannot change overnight and it will, probably, take many years for the new paradigm to expand in a way that can serve the majority of world's population. Therefore, in parallel with the expansion of this new paradigm of private sector participation, there is an expressed need of helping the public sector, in particular at local level, to improve the sustainability and financial viability in the provision of water services.

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